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THE OPTICS OF RETINOSCOPY

Erik K. Eliason, Opt. D.
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After giving some thought to the subject of retinoscopy I have come to the conclusion that the usual manner of explaining the subject is not very satisfactory, to say the least.

The assumption that the refractionist is really looking at the aerial image of the illuminated spot on the patient's retina does not seem correct to me. I think all optometrists will agree that in using the retinoscope, their eye is fixed on the pupil of the patient.

What we see in looking at any object, is really the rays converging to our eye from every visible point of the object. Since there must be a ray reflected into our eye from every visible point of the object which we see, we may consider the nodal point of our eye as a focal point where rays from all these various points of the object meet, in passing into our eye. The same thing holds good when we are looking at the patient's pupil in the retinoscopic test; we see the rays which emerge from the patient's cornea and fall on the nodal point of our eye.

For the sake of clearness in this discussion, we will not make any allowances for the optical value of the working distance. We will also suppose that all the emergent rays from the patient's cornea, which are visible to the operator, pass through the nodal point of the operator's eye. This is not the case, strictly speaking; since the operator will in reality see all the rays which fall on any part of his pupil and pass beside the nodal point of his (the operator's) eye, in addition to those that pass through his nodal point. But we know that in the formation of images, by any lens or other optical system, the peripheral rays are symmetrically grouped about the rays which pass through the nodal point, and they fall on the same focal points as the rays which pass through the nodal point, so our deductions will be sufficiently accurate if we disregard the peripheral rays.

Right here I may state that when we look through any lens, or its equivalent, the light which we see, must be rays which emerge from every point on the surface of the lens in such a direction that they will strike the nodal point (or pupil) of our eye. From the law of conjugate foci we know that if rays converge to a point, or focus, on one side of a lens, after passing through the lens, the incident rays must all strike the lens at an angle such, that their course may be traced to (or through) a conjugate focal point. If the nodal point of our eye were placed at the point where the rays emerging from the lens would meet, or come to a focus, we could see no light whatever coming through the lens, unless the incident rays would strike the lens in such a direction that they could be traced to the focal point conjugate to our nodal point, as we were looking through the lens. Keep this point in mind as it is necessary for a clear understanding of some points to be mentioned presently.

Therefore, if we would suppose that the nodal point of the operator's eye were a luminous point, it will readily be seen that some of the rays proceeding from it would fall on the patient's eye. The rays thus falling on the same points of the cornea from which we saw the light emerging in the retinoscopic test, would be refracted through the optical system of the patient's eye in the identical paths of the emergent rays which we saw come out of the pupil; because the direction of the light passing between two conjugate focal points is always reversible.

This goes to prove that we are perfectly justified in taking the nodal point of the operator's eye (while he is using the retinoscope) as one of the conjugate focal points of the optical system of the patient's eye and whatever lenses may be placed in front of it during the test. The other conjugate focus will then be situated somewhere behind the patient's pupil, either in front of, upon or behind his retina, ac-

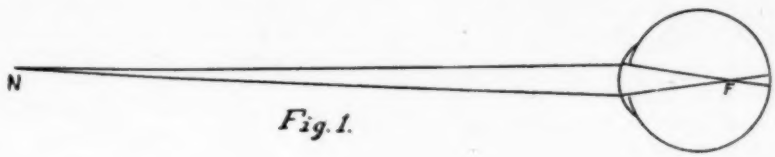

Fig. 1.

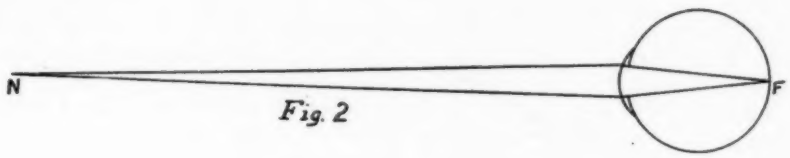

Fig. 2

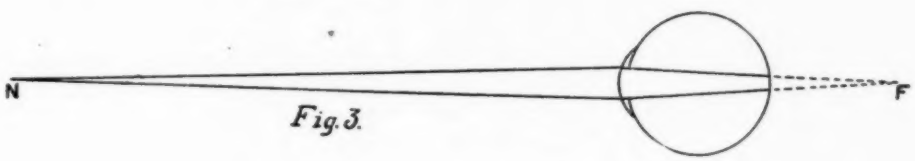

Fig. 3.

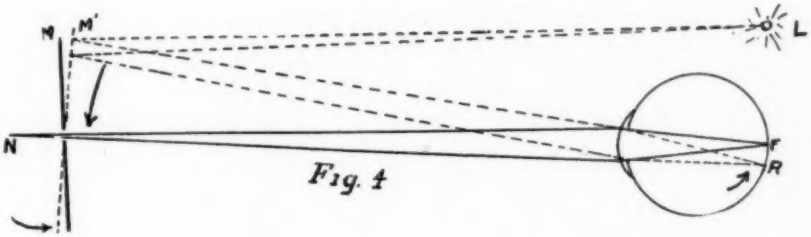

Fig. 4

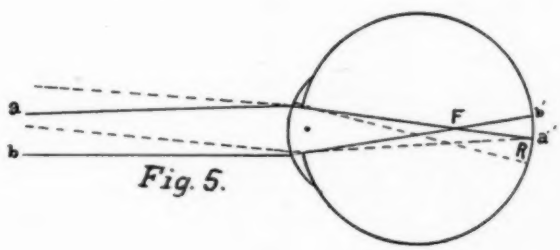

Fig. 5.

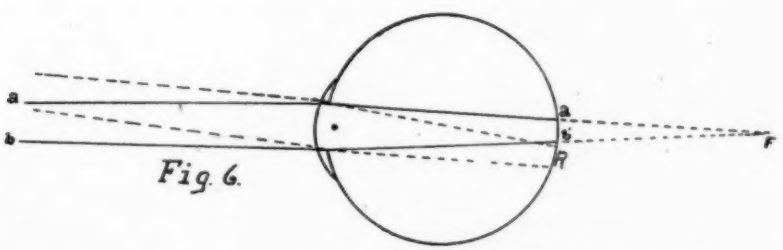

Fig. 6.

cording to the refractive condition of the eye; as shown in figures 1, 2 and 3, where N is the nodal point of the refractionist's eye and F the focal point conjugate to the operator's nodal point, in the case of Myopia, Emmetropia and Hypermetropia respectively.

The source of light, so far as the patient is concerned, appears to move

from one side of the mirror to the other, as the mirror is turned. It is this change in the apparent position of the light which makes the retinoscopic test possible.

As the operator holds the mirror in such a position that the light falls upon the patient's pupil (Fig. 4), there will be an image (R) of the light (more or less clearly defined) formed upon the retina of the patient's eye. This image will be in the form of an illuminated spot, and it can be shown that when the mirror (M) is rotated, the movement of this spot will be in the same direction upon the patient's retina as the movement of the plane mirror, as shown by the arrows in Fig. 4. This is always the case, irrespective of the refractive condition of the eye or the glasses placed in front of it. If the image is not clearly focused on the retina, the circle of diffusion will be placed symmetrically about the central ray which always will pass through the nodal point of the eye unrefracted. From this it will be seen that the only bearing the refractive condition of the eye under test, or the lenses in front of it, have on the behavior of the illuminated spot upon the retina, will be a difference in the clearness and size of the spot. It is evident that the spot will be somewhat larger when the image is blurred.

In a recent copy of one of the leading optical magazines,* one of the contributors made a statement to the effect that the findings in the retinoscopic test would be effected to an amount equal to the convergence or divergence of the light used for the test, unless the light were so arranged that the rays were parallel. It will be seen that this is not the case, if we remember what has just been said about the behavior of the luminous spot upon the patient's retina. However, it is evident that the clearer the image of the retinoscopic light is defined on the patient's retina, the easier it will be to see the movement of the light (or shadow) in the pupil, so the nature of the rays entering the eye will effect the test to this extent, even if there is no difference whatever in the lens power required for neutralization. Hence the ideal light is one which will diverge as from the nodal point of the operator's eye. In that case the image of the light will be sharply focused on the patient's retina just when the point of reversal has been reached in the test.

This leads to a consideration of the reason for the reversal of the shadow. The theory here set forth differs from the usual ones, but I think you will admit the soundness of the reasoning after you have thought the matter over.

The first thing to remember in this connection is that the illumination which we see in the patient's pupil is simply light reflected back to our eye from the illuminated spot on his retina, where the image of the retinoscopic light falls upon it. This light is reflected back to us as from a **source** of diffused light, which of course sends rays in all directions, **not as from a mirror.**

Another point which must be remembered (as already alluded to) is that when we look at the patient's eye and fix our gaze on any point of his cornea in front of his pupil, there would be only one definite point on his retina from which a ray could be so reflected that it would strike our nodal point after being refracted through the optical media of the eye so as to emerge from the given point on the cornea. For every point on the cornea there would be a corresponding point on the retina, and in reaching that point the ray would travel either toward, to or through the focal point conjugate to our nodal point, in passing from the cornea to the retina.

In emmetropia every ray thus traced from the nodal point of our eye to the patient's retina would fall on the same point, which would also be the focal point conjugate to our nodal point; so it is clear that if the retinal illumination should fall on this point the rays reflected back to every part of the pupil from this point would all be refracted so as to fall on the nodal point of our eye, so the entire pupil would appear illuminated to us. If the light did not touch this point of the retina the entire pupil would appear dark to us. This is shown in Fig. 4, where N is the nodal point of the refractionist's eye and F is the conjugate focal point which falls directly on the retina. M is the mirror of the retinoscope, L is the light and R is the image of the light on the retina. So long as the mirror is held in the position shown by the dotted lines at M' the light will be reflected into the eye from the di-

rection shown by the dotted lines, and the image (R) of the light will not touch the point F, so the entire pupil will appear dark. But as the mirror is slowly rotated from M' to M the direction of the light entering the eye will gradually approach the line of vision of the operator (from N to F) until it will fall in the same path. Then R will coincide with F, so the light will be reflected back from F and the entire pupil appear illuminated as previously stated.

Referring to Fig. 5, where the condition in a Myopic eye is shown somewhat exaggerated, the solid lines a and b represent the line of vision of the operator's eye, through the refractive media of the patient's eye to his retina. It will be observed that the rays focus at F, and from there on they again diverge, so the part of the retina included between the points a' and b' may reflect light back through F to the operator's eye (we remember that light cannot be refracted back to the nodal point of the operator's eye unless it diverges from F) so the retinal area included between the points a' and b' will be visible to the operator, or in other words, any point of this area may reflect rays of light through F to the operator's eye. As the mirror is slowly turned the same as in the case of emmetropia (Fig. 4) the retinal illumination shown by dotted lines (Fig. 5) will approach the operator's line of vision, and the illumination on the retina (R) will begin to creep in on the operator's field of vision at a'. As the retinal point on which the operator's line of vision (a to a') falls becomes illuminated, it will reflect a ray of light back through F in the same line as the operator's line of vision, so the operator will see the side of the pupil traversed by the line a illuminated, and as the retinal illumination moves from a' to b' the rays passing through F will gradually cover a greater area of the pupil, beginning at the line a and spreading toward the line b until the retinal illumination has covered the entire area included in the operator's field of vision, when the entire pupil is illuminated. We see that in passing through F the rays reflected back from the patient's retina cross, so they emerge from the pupil on the side opposite to the position of the retinal illumination, therefore the motion is against.

In the case of the Hypermetropic eye the motion is with, because there also the rays which the operator's eye will see must necessarily proceed in such a direction that if they were projected backward they would all meet at the posterior point conjugate to the nodal point of the operator's eye. Then as the illuminated spot on the retina moves in on the area included in the operator's field of vision, as shown at b' Fig. 6, the light from that point will be reflected to all directions, but the operator's eye can only catch the ray reflected back in the path of the line b' to b, because that is the only one which proceeds as though its source were at F. We see that in this case the light visible to the operator emerges from the same side of the patient's pupil (or cornea) from which the retinal illumination begins to creep in on the area included in the operator's field of vision (b' to a'), therefore the apparent movement of the retinal illumination visible to the operator will be in the same direction as the motion of the mirror. In other words the motion is with.

In our discussion so far, a uniform refractive condition has been assumed to exist in all meridians. In cases where astigmia is present it is evident that the different meridians will present the above mentioned ametropic conditions to varying degrees (unless it should happen that some meridian is emmetropic). Or it may also happen as in the case of mixed astigmatism that some of the meridians may present the opposite kind of error to that found in other meridians. But the principles involved are the same as those already set forth, so no further comment is necessary.

*Claud M. Hall, in the "Optical Age," November, 1923, page 35.

NOTES, CASES AND INSTRUMENTS

INSTRUMENTAL ARRANGEMENT

J. L. KUBICEK, Opt. D.
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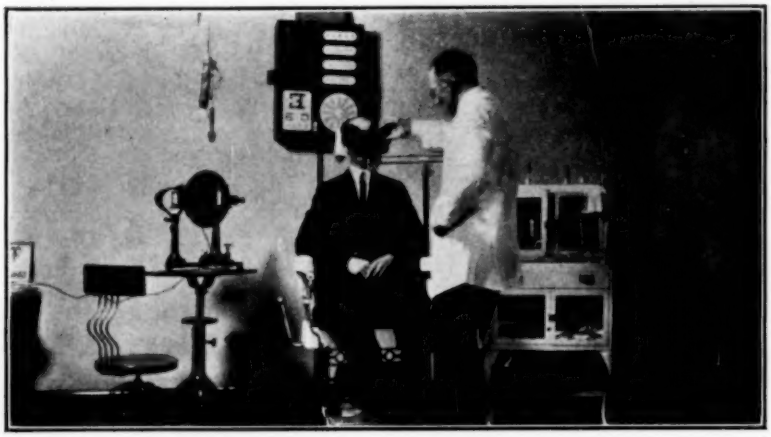
The ease with which a refraction can be carried out and the accuracy of the work done, in a large measure depends upon ones opthalmic instruments and their proper arrangements. It has been my experience not to attempt a refraction from one chair, but rather groop the refracting equipment in a more or less logical sequence, and then move the patient from one instrument to another. Figure (1) gives an idea of one end of the writer's refracting room.

Fig. 1



ESOTROPIA

Ralph I. Colberg, Opt. D.
Aberdeen, S. D.

On January 3, 1924, Miss R. came to me with a severe case of Homonymous Diplopia, which came on very suddenly the previous day.

She was a bookkeeper and thirty-one years of age. My examination revealed 24 degrees of Esotropia. No refractive error existed and she had never worn glasses and felt no need of them. She told me that she had been working overtime of late and consequently had been working her eyes quite strenuously. On rising the day before she came to me she was aware that all objects appeared double and that vision was very painful. The external rectus muscle acted very much like a paralyzed one. It would not allow the eye to turn out from parallel.

Due to her age and the unsatisfactory condition of the external rectus muscle I held little hope of overcoming the muscular imbalance other than prescribing prisms. I instructed the patient to call regularly each morning until I would know definitely whether I could straighten this eye or if I would have to prescribe prisms.

After my examination and instructions to come back I gave her an eye patch and told her to wear it constantly over the right eye (she had been holding her handkerchief over the deviating eye because of the extreme pain in endeavoring to use both eyes). My idea in instructing her to wear the eye patch over the good eye was to force the deviating one to try and correct itself. The following morning after giving her the eye patch she complained that vision was both difficult and painful with that eye. This I could appreciate because of the fact that she was endeavoring to look at the objects directly, and of course was trying to force the external rectus muscle to function.

In the meantime I gave her a series of muscle exercises (Oculo-Prism Treatments) principally with the Phoroptometer. She came daily and I encouraged her as much as possible.

After the first several treatments the Esotropia began to show signs of improvement and in three weeks she was again able to maintain binocular vision and to discard the eye patch the greater part of the day.

At this writing I am glad to state that a perfect state of Orthophoria exists and that the external rectus muscle which caused me so much anxiety is able to turn her eye as far as any normal one.

Personally I think this is a case that is unusual both from the standpoint of the sudden onset and also the short time in which it was corrected. I am unable to say whether it was through my efforts or because of the fact that I insisted she take a complete rest from her work while her eyes were in this condition. Nevertheless, she is back at her work and is thankful for good eyes, once again. She was agreeably surprised when I informed her that she would need no glasses. Several of her friends had told her she would now have to wear them and that nothing else would help.

The proper handling of these cases will bring the public to the great realization that our profession is the logical one to appeal to when in need of eye care.

PUNKTAL LENSES

Ernest Fielding, Opt. D., F. A. A. O., Omaha, Neb.

The Punktal lens is not new. It has been before the refractionist many years, and, like all real scientific products, its popularity will come slowly but will be lasting. The writer does not hesitate to put his name upon the prophecy that the Punktal lens will stand the scrutiny of any sort of scientific investigator.

The greatest trouble maker in Ophthalmic Optics is the fact that correcting lenses cannot be placed upon the eye in such a manner that they will rotate with the eye in all directions. We must place the lenses in frames which are supported by the nose and ears or portions of the anatomy other than the eye itself.

The result of this is that the eye seldom uses the exact optical center and the line of vision is directed, for the most part, obliquely through the glass. Prismatic action results from the use of any portion of the glass except the optical center, and astigmatism is produced when the line of vision through the glass is other than normal to the surface.

The former condition cannot be helped, but it is negligible, except in cases of considerable Anisometropia. Marginal astigmatism, however, can be corrected within certain power limits in lenses of spherical curvature.* It can be corrected in any lens by making one surface aspheric. The latter method is not necessary if the power is a plus eight diopter or less. By proper bending of the lens surfaces about the center of rotation of the eye, marginal astigmatism is reduced more or less, and if the curves are calculated for each separate power combination, this astigmatism can be entirely eliminated.

This has long been understood and the commercial Toric or Meniscus has come in to great popularity. In fact, with its deep curve and resulting wider angle of clear vision, it has largely supplanted the flat lens. But the Toric, as it stands today, is a long way from the ideal lens. In the first place it is built upon an arbitrary base curve which is an unsound compromise. A standard base curve can be correct in but a very small group of lens combinations.

The Punktal series is in no way a compromise because it has no base curve. The inventor was certainly not planning a lens that would be easily and cheaply produced. For nearly every power, the curves are different. The writer has gone over hundreds of these lenses with a spherometer, and, at one time, thought he had figured a system of very close approximation. After some experiment, however, it failed utterly to give results.

The Punktal lens is surely a joy to those refractionists who delight in careful and precise refraction. It is interesting to note that stocks of this lens are more numerous than formerly, so they are easier to obtain upon prescriptions.

The writer does not think that this series of lenses will ever supplant the good old Toric, or even the Flat, but to the patient or the refractionist who is interested in the best that science has produced for Optometry, Punktal lense must appeal.

*By spherical curvature, we mean any regular surface as opposed to an Aspheric surface.

ABSTRACT DEPARTMENT

Marlow, F. W. Prolonged Monocular Occlusion as a Test for the Muscle Balance. American Journal of Ophthalmology. Series 3, Vol. 4, No. 4, 1921.

Marlow suggests and describes a method he uses from time to time to establish if possible a complete relaxation of all of the rectus muscles. Briefly, the method is as follows: The non-dominant eye is glassed with an opaque lens. This lens has a paper covering on its inner surface to remove all glares. The dominant eye, uses its full correction. Cases treated in this manner usually use this correction from seven to ten days. The tonicity and duction tests are made daily. It is very important that the patient uses the correction at all times, and when this procedure has been faithfully carried out some startling findings are revealed in the muscle balance of certain obscure heterophoric cases.

C. C. K.

Marshutz, H. S. Motion-Picture Making Brings New Dangers to Vision. Optical Age. Vol. 20, No. 2, pp. 32-34 (Ill.), 1923.

The term Klieg Eyes has been used extensively in optometric literature during the past several years. This type of ocular pathology, experienced by motion picture people, is becoming more and more prevalent as the illumination in the studios is increased.

Kliegs, as the ailment is commonly called, brings severe suffering, its manifestations being described in a general way as similar to symptoms of electric ophthalmia, snow-blindness, etc. Violent attacks of conjunctivitis, retinitis and cyclits are common. The victim suffers ocular pain and a feeling as if "sand were in the eyes." Quite similar suffering must be endured by those who become afflicted with catarrhal conjunctivitis, though Klieg Eyes, greatly magnifies the annoyance. Often nocturnal excretions completely close the palpebral fissures. Klieg Eyes is a pathological condition, but not a germinal infection, it being due to external invisible causes, that seem to affect vision. The theory is that the large amount of ultra-violet rays in the Klieg arc-lights is responsible.

C. C. K.

Howard, P. H. Focal Infections. The Optical Journal and Review. Vol. XLIX, No. 3, pp. 43-45, 1922.

Howard, in a paper on Focal Infection, describes this type of pathology as a secondary infection due to primary lesions becoming disseminated through the system, thus producing secondary lesions.

Etiology or Cause.—Infections must be from the surface of the body or from the invaginated portions, as the alimentary tract, the respiratory tract, or the genital-urinary tract. Skin infection makes access only through boils and carbuncles, or through the genital-urinary tract, or the rectum, or through the mouth (from ulcerated teeth, tonsils—from infection through the crypts), through adenoids in children or infections absorbed from the middle ear (this infection being secondary from primary infection from the nose, through the eustachian tube).

The causes of all diseases are non-biological and biological. Non-biological causes are four great classifications: Mechanical, thermal, electrical and chemical.

Biological divisions are two, parasites and bacteria. The subdivisions of bacteria are the spirillum, bacillus and the coccus, the subdivisions of the cocci being many. We have two of these subdivisions to consider most. The staphlo-coccus and the strepto-coccus.

The staphlo-coccus always tends to form a circumscribed area of inflammation, containing pus, namely an abscess, and by proliferation of connective tissue is always able to wall off this form of infection. It never becomes secondary or general, so we do not consider the staphlo-coccus as a cause of focal infection.

But the strepto-coccus (growing chain-like and regardless of the physical condition of the individual), especially if it is of the virridens or hemolyticus group, produces focal infection. Outside of the specific diseases such as syphilis and gonorrhœa, the germs producing focal infection are the strepto-coccus virridens and the strepto-coccus hemolyticus.

Pathology of Focal Infection.—From the external invasion from these specific varieties of the strepto-coccus we

have a circumscribed area of inflammation, which instead of being a well defined wall, is a ragged edge with very little proliferation of connective tissue, and not a complete walling off of pus. The capillaries, which have only the one layer of endothelia lining, permit the direct invasion into the blood stream of the strepto-coccus, affecting primarily the heart (the mitral valve having a deposit near the opening, with the semi-lunar aortic valves), producing apex murmur.

This murmur is due to the inability of the valves to close and causes regurgitation of the blood, which persists throughout life when once formed but does not cause the speedy death that results from the apex murmur from syphilitic lesion of valves. Focal infection is disseminated throughout the body to all the organs, tissues and parts, thereby producing as much symptomatology as could be found by taking into consideration all of the conditions, aches and pains of which the body is susceptible. For instance: Rheumatic pains, gout and similar conditions producing aches and pains, are all due to focal infection, the same as headaches, pains in the neck, tonic spasms of certain muscles, as well as the complete symptomatology of brain, kidney, liver and other lesions.

Microscopical Pathology.—First irritation by the bacteria, infections of the germ, dilitations of the blood vessels, hyperemia (an excessive amount of blood to the part), congestion followed by stasis (complete stopping of blood), migration of leucocytes through the vessel wall. The small opening made in the vessel wall by this pseudo-podic movement of the leucocytes allows the passage of the liquid constituents of the blood, which gradually causes an enlargement of this opening and allows an exudation into the part, of all the constituents of the blood. The termination is the resolution or death of the tissue or part. Where the infection is of the staphlococcus group, regardless of the place of infection, this always takes place with the formation of abscesses. However, when the infection is of the strepto-coccus virridens or the streptococcus hemolyticus, there is an inability on the part of the body to wall off this infection regardless of the physical condition of the person. Here we have a ragged edge, not the smooth edge of the staphlo-coccus, so in this case the point of infection may be only slightly larger than the head of a pin and still the systemic condition be well pronounced.

Symptomatology.—One of the principal symptoms of focal infection is headache. This headache may be general, but it is usually localized to the temple region and to the central-frontal region and to the neck.

Diagnosis.—Diagnosis of Focal Infections is made by the use of many instruments and methods at our disposal, such as the X-ray, trans-illumination, the sphygmomanometer and the blood tests and cultures.

The X-ray shows absolutely the rarified areas on the roots of the teeth, whereas the individual may not have any soreness on the roots of the teeth and may not in any way know that the teeth are bothering him, so we use the X-ray as a guide in differential diagnosis of all cases.

The trans-illumination, to a somewhat limited extent, shows the rarified areas on the teeth and the darkened areas on the antrum infections.

The sphygmomanometer is used to test the blood pressure. Lowered blood pressure indicates anemia, tuberculosis, or any wasting away disease. High blood pressure is indicative of focal infection and high living.

Blood tests are the individual blood count and the relative increase in the number of neutro-philes. This shows a focal infection within the body and an increase in the number of these specific leucocytes to destroy the infection. Cultures are made from the teeth where it is possible to press the pus from the gums ;and from the tonsils, where pus cultures are obtained by means of a platinum wire loop which is in turn dipped into a culture media and sent to the laboratory for examination, as the use of the incubation is to show how they grow. Then there is the individual diagnosis under microscope to show the special variety of the strepto-coccus infection.

The above methods, taken with the histories of the cases and the symptomatology and the elimination of the specific diseases by history and the "Wasserman," will enable one to arrive at a definite conclusion as to the symptoms of the aforementioned.

Prognosis.—The prognosis of focal infection must always be guarded. In

many cases even though the cause has been removed, sufficient pus has already entered the system to produce death.

Treatment.—Treatment of focal infection is strictly surgical, such as the removal of the teeth, tonsils, adenoids, removal of pus from the antrum, ethmoid and sphenoid sinuses.

C. C. K.

Wilson, N. L. Corneal Glass for Conical Cornea. The Eye, Ear, Nose and Throat Monthly. Vol. 2, No. 10, p. 541, 1923.

Wilson reports seeing a new method of improving the visual acuity of patients suffering from conical cornea. The patient he describes was a German who had suffered from conical cornea since childhood. He could, with the aid of very strong minus lenses, see large objects about the room.

However, for the last year he had discovered by wearing a glass covering, over the eyeballs he was enabled to see at the distance and transact his business of a traveling salesman.

The glass shells were similar to our reform eyes except they were of single thickness, and where the iris and pupil were in the reform eye it was a clear glass which enabled him to see.

He removed them in the same manner as an artificial eye was removed. There was little or no ulceration upon the cornea notwithstanding the pressure of the glass segment upon it. He was very enthusiastic about it and explained how carefully they had to be made and said they were made only in Munich.

C. C. K.

Sharrett, G. O. The Desirability of a Fileable Record of Examination of the Hearing of Applicants for Employment with Industrial Corporations. The Eye, Ear, Nose and Throat Monthly. Vol. 3, No. 1, pp. 23-28, 1924.

Sharrett emphasizes the need for a proper routine in industrial examinations and describes in detail, with charts and records the need of making such a routine both painstaking and complete. In this paper he deals chiefly with the neglected matter of the hearing tests. A part of the paper is taken up with describing the Audiometer. This is an instrument used in making a record (an Audiogram) of the applicant's ability to hear. The instrument is used as follows:

"The patient is seated in such position as not to see the Audiometer or operator. He is then given a receiver and signal lamp button and instructed to hold the receiver snugly to the ear under test and to keep the button depressed at all times while he is hearing a tone. This button operates a signal lamp so that the operator may know when the patient is hearing a test tone. The object of this measurement is to determine at each frequency the faintest tone that the patient can hear. It is advisable to begin with an intermediate frequently, say 512 double vibrations. It is best to begin with an intensity that the patient can easily hear but not so loud as to be disagreeable. Interrupt the tone and see that the patient signals properly. Decrease the intensity and test again with the interrupter. In this way a point will be reached where the patient no longer responds. Repeat this process through the lowest intensity that the patient can hear."

In his industrial work Sharrett finds that at least ten per cent of all employees have a marked deficiency of hearing, and attributes many industrial accidents to this cause.

C. C. K.

BOOK NOTICES

ANATOMY AND HISTOLOGY OF THE HUMAN EYEBALL IN THE NORMAL STATE.

By Dr. Maximilian Salzmann. Titular Professor of Ophthalmology in University of Vienna. Translated by Dr. E. V. L. Brown. Instructor in the Pathology of the Eye in the University of Chicago. 232 pp. with 5 text figures and 9 plates in Photocollotype. Univ. of Chicago Press, 1912.

Dr. Salzmann, like others, developed this book from his regular lectures and in his preface says, "I should like to have the book considered from the point of view that it is the eye specialist and not the specialist in anatomy who writes it." The book is divided into two parts: Part 1 being the Anatomy and Histology of the Adult Eyeball; Part 2, the Physiologic Changes of the Eyeball During Life (Development and Senescence). Part 1 gives a concise histology of the eyeball, showing the microscopic study of the various layers of the eye structures and, also, the blood and the nerve supply of each structure. The author recognizes nine layers of the retina in confliction with other authors who give seven, eight and ten layers. But here is a point which evades argument as the retina is the most susceptible to cavaverous changes and dissection is difficult. The chapter on the development of the eye is a collection of notes of embryologists and is a departure from the usual writings in that the developments are noted in the metric system instead of in periods of time. A knowledge of the histology of the eye is essential in refraction as the mere placing of lenses before the eye is not all of the examination and when an eye-ground is viewed the differences should not pass unnoticed. With an understanding of the anatomy and the histology of the special eye structures one's work is rendered easier, the reasons for certain conditions are seen. Salzmann has not fallen down in his attempt to give us his lectures and researches and in his book one finds much of interest.

E. O. F.

TREATMENT OF SHORTSIGHT

By Professor, Doctor J. Hirschberg, Translated by **G. Lindsay Johnson, M. D., F. R. C. S.** 124 Pages, 12 Illustrations. Rebman Co., New York, 1912.

This treatise on myopia is very complete, giving the etiology, the probable prognosis and the treatment, in many cases of high degrees of myopia. Hirschberg emphasizes the need for the careful correcting of these unfortunate nearsighted cases, and points out the possible pathologic conditions which may be looked for in cases of this sort. A portion of the book deals with the surgical relief which may be given these myopic cases of 15 Dioptres or more. This relief is afforded by the needling and the subsequent removal of the crystiline lens. The book ends with some splendid advice on the hygiene of the eyes as applied to myopia.

C. C. K.

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JACK I. KURTZ, Room 209, Yeates Building, Minneapolis, Minnesota.

THE KIEKENAPP PLAN

The plan for State Optometric Clinics as fostered by Dr. E. Kiekenapp, of Faribault, Minnesota, the national secretary of the American Optometric Association, seems at the first reading to have the germ of success, well planted in it.

The financial assistance the American Optometric Association would give to the state organizations under this plan, we believe, to be just the incentive needed to make the several state societies establish these educational clinics, and it is at gatherings of this sort that not only can the public be benefited but optometrists as well can improve their refracting technic.

C. C. K.

A PLEASANT DUTY

Dr. Charles Sheard, scientist, philosopher and critic of life and letters, formerly of Ohio and later of Massachusetts, has come to Minnesota. Dr. Sheard brings with him, the vast fund of knowledge acquired through years of study in his chosen field of optics, as well as the good wishes of optometrists the world over.

It is indeed pleasant to think that our world renowned friend is so near at hand, and to think, that, while he no longer directs his effort entirely along the lines of optometric research, he nevertheless is here and all men of the central-west will benefit from his presence.

For some time to come Dr. Sheard will be very busy, arranging his new

home, meeting his new colleagues, starting his new work and making new friends, it would therefore be a decided injustice to him, for the optometric societies of the northwest to call upon him for the help he has always been so glad to give, nevertheless—

Dr. Sheard, the optometrists of this section wish to interrupt you for a moment—

We wish to tell you how glad we are to hear of your coming. We know how richly you deserve the success that is bound to come to you and we most heartily join in wishing you, the best of good things.

C. C. K.

THE WORK OF THE PRESENT.

Among the recommendations made by President Nordland, in his address of welcome at the recent convention of the Minnesota State Association of Optometrists, were some whose broad need lies, not only for the men of Minnesota but for optometrists of all states and the present repetition of these needs and a stressing of these phases of our society work at this time may prove of some help to the new officers of the Minnesota Society who seem eager to be up and doing, as well as to officers of the several other state societies.

To quote Dr. Nordland, our first need is Education. Our preparation, our training and our skill must naturally form the foundation of our profession; and it is necessary that we not only continue the education of ourselves in order that we serve humanity best, but we must also do all in our power to establish proper courses of instruction for those who in the future will practice optometry.

Next in order is the importance of legislation which should safeguard the interest of the public as well as of the optometrist. It is quite apparent that our laws regulating optometry must be amended from time to time so as to keep up with the ever changing conditions.

Third in order, is the right kind of publicity. The public should become familiar with the true meaning and value of optometry. This can be done in various ways and the best method to acquaint people with optometry is the establishment of proper optometrical clinics, with the proper optometric publicity to back them.

Our fourth need is the adoption and enforcement of both National and State codes of ethics.

And fifth, applicants for licenses to operate motor cars should be required to undergo a test of both acuity and radius of vision.

And finally, it is our duty to drive home the proper Hygienic truths regarding the care of the eye, to the public at large.

C. C. K.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

NORTH DAKOTA OPTOMETRIC ASSOCIATION REPORT

Code of Ethics Committee

The Code of Ethics Committee appointed at the last convention of the N. D. O. A. are working on the proposed Code of Ethics and report favorable progress. They expect to make a report in the very near future.

The 1924 Convention

The 1924 convention of the N. D. O. A. will be held in Fargo, N. D., some time during the early part of August. The exact dates have not been decided owing to the fact that it has been found advisable to dove-tail our meeting with those of other states in order to attempt to procure the same speakers, lecturers or directors of clinics. The chairman of the Department of Education, A. E. Cannon, and Secretary L. J. Anderson are working together on the educational part of the program. As soon as details are available they will be published to the membership. Those of you who attended the last convention will remember with a great deal of pleasure, Dr. Charles Sheard's splendid contribution, and we all are delighted to hear that he has accepted the position as chief of the section of physics and biological research at the Mayo clinic at Rochester, Minnesota. We hope that his nearness to us will make it possible to have him again at some of our future conventions. We will also arrange to have clinical work, showing how some of the latest instruments are used in refraction work. This we feel is the crying need today; the education of the practitioner in the use of these wonderfully, precise instruments that are now being offered by instrument makers. During the past two years especially, our optical equipment has been wonderfully improved. Through the courtesy of the Riggs Optical Company we will have shown to us all of the latest, improved equipment and clinics will be conducted by a very competent lecturer. The attendance last year was very gratifying. Let us not fall down this year. Make this year the best ever in point of attendance. That is YOUR PART. The program committee will do their part. Next month we hope to publish something more definite relative to the program.

The A. O. A. Convention

The A. O. A. convention will be held in Kansas City, June 9th to the 14th. We are entitled to two delegates. Dr. C. G. Hendrickson of Grand Forks expects to attend the convention unless present plans are interfered with. We hope that many others will attend. A. O. A. conventions are always worth while. Any members who plan on attending this convention are requested to notify the secretary, Dr. L. J. Anderson, Grand Forks, N. D., and the first two so doing will be given credentials as delegates.

State Board Activities

The North Dakota State Board of Optometry held a special meeting in Fargo, N. D., March 13th. This was essentially an organization meeting. The present members of the board are, Drs. R. P. Merritt, Kenmare, N. D.; H. Kornmesser, Jamestown, N. D.; R. E. Bonham, Bismarck, N. D.; O. M. Varnson, Fargo, N. D., and L. J. Anderson, Grand Forks, N. D.

Dr. R. P. Merritt was chosen as president and Dr. L. J. Anderson as secretary. The dates of the next examination were tentatively set as May 15 and 16, the place, Hotel Waldorf, Fargo, N. D. All applicants are advised to send in their applications by May 10th.

L. J. A.

TO STUDY RETINAL PIGMENTATION

Dr. Roy S. Dean, second vice-president of the Minnesota State Association of Optometrists, has announced the committee who are to assist him in the formation of the educational department for the year 1924. Dr. A. J. Large, of Winona, and Dr. W. H. Nordin, of Faribault, were appointed.

They are formulating plans for educational work, particularly the development of the technic of ophthalmoscopy, laying particular emphasis on the effect of illumination upon the retinal pigment.

This is a subject that has not been touched before in any optometric literature and judging from Dr. Dean's experience in watching changes in the color and texture of retinal pigment while doing his industrial eye work, this year's study should prove of great interest to the society and to the profession at large.

ST. PAUL SOCIETY ELECTS 1924 OFFICERS

The officers elected to serve the St. Paul Optometric Society for the year 1924 were elected a few weeks ago. Dr. N. Klaers was elected president; Dr. P. R. Boerninger, vice-president; Dr. G. C. Jensen, secretary, and Dr. C. Zwicky, treasurer.

The St. Paul society meets for dinner and lecture on the last Tuesday of each month at the Elks Club. Out of town optometrists who are in St. Paul on these meeting dates are urged to attend the sessions with the St. Paul society.

QUARTERLY MEETING OF THE EXECUTIVE COUNCIL OF THE MINNESOTA STATE ASSOCIATION OF OPTOMETRISTS.

At a recent meeting of the executive council of the Minnesota State Association of Optometrists, the following optometrists were voted into the association:

Jenson, Geo. C., St. Paul.
Fjelstad, E. O., Red Wing.
Klaers, N. M., St. Paul.
Beinhorn, E. A., Winona.
Frank, J. L., New Prague.
Lee, James E., Minneapolis.
Moran, A., Minneapolis.

It was also decided to organize a corps of public speakers to carry the message of optometry and of conservation of vision directly to the public. All optometrists who wish to join this group as speakers are requested to send their names in to the secretary, Dr. Kurtz, at once.

ITINERANT ARRESTED

Through the efforts of Dr. J. I. Kurtz, secretary of the Minnesota State Association of Optometrists, one Patric H. May, an itinerant "Spectacle Fitter" who holds no optometric license, was arrested and given a 30-day jail sentence. This sentence was later suspended, the accused promising to give up his illegal practice.

Optometrists throughout the Northwest should be on the look out for men of this type who are preying upon the public, and when one is heard of they should at once notify Dr. E. Kiekenapp, secretary of the State Optometric Board, or Dr. J. I. Kurtz, secretary of the state society.

OPTOMETRIST ELECTED MAYOR

Word was recently received that Dr. H. Bandle, Optometrist, had just been elected Mayor of Spring Valley, Minnesota. Dr. Bandle is one of the Collaborators of the Northwest Journal of Optometry, and the editor as well as his staff join, in wishing him well, in his new undertaking. Incidently, Dr. Bandle is doing optometry a great service, insomuch as he is putting our profession forward in the best possible light, that of doing a public service.

PUBLICITY CAMPAIGN MATERIAL FOR MINNESOTA OPTOMETRISTS

Dr., H. B. Kollofski, Optometrist Third Vice President of the Minnesota State Association of Optometrists, in charge of the department of Publicity and Public Information, has completed a plan to furnish copy for Optometric publicity, to members of the State Society.

Optometrists who wish to take advantage of this opportunity of getting some splendid conservation of vision copy and some optometric press material to release to their local papers, should send their names to Dr. J. I. Kurtz, as the material will be sent out from the secretary's office. Full instructions will accompany the copy, which will be sent out at regular intervals to those wishing this service.

REFRACTIVE CLINIC

The Minneapolis Association of Optometrists will hold a Refractive Clinic at the office of Dr. L. L. De Mars, on the third Wednesday of April. All optometrists are urged to attend.

CURRENT LITERATURE

These are the titles of papers bearing on optometry. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the Authors name in **heavy face type.** The abbreviations mean: (Ill.), illustrated; (Pl.), plates; (Abst.), indicates that it is an abstract of the original article; and (Dis.), that discussion is published with paper.

GENERAL REFRACTION

Adams, E. Instruments for Refraction. Opt. Jour. and Rev. Vol. LIII, No. 8, pp. 25-26 (Con.).

Aronsfeld, G. H. The Light Movement in Retinoscopy (Ill.). Opt. Age. Vol. 20, No. 11, pp. 20-22.

Bandle, H. T. Retinoscopy. N. W. Jour. of Optom. Vol. 1, No. 3, p. 49.

Drakeford, J. H. Time Savors. Opt. Age. Vol. 20, No. 11, p. 35.

Fox, L. W. Heterophoria and Astigmatism Charts (Abst.). N. W. Jour. of Optom. Vol. 1, No. 3, p. 52.

Goldnamer, W. W. Meter Measure for Retinoscopy (Abst.). N. W. Jour. of Optom. Vol. 1, No. 3, p. 50.

Jackson, E. Practical Aspects of Irregular Astigmatism (Ill.). Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 199-203.

Koch, C. C. Corneal Astigmia. N. W. Jour. of Optom. Vol. 1, No. 3, p. 50.

Peckham, R. M. The Cross Cylinder as a Check Test (Ill.). The Conn. Optom. Vol. 1, No. 1, pp. 5-8.

Ronne, H. False Movements in Vision Through Spectacle Glasses, Their Significance and Connection with Vestibular Apparatus (Abst.). Opt. Jour. and Rev. Vol. LIII, No. 8, pp. 27-29.

Scherer, C. M. Astigmatic Corrections. Opt. Age. Vol. 20, No. 11, pp. 45-48. Reprints in The Optom. Wky., Vol. 14, No. 52, pp. 2608-2611, and in the Opt. Jour. and Rev., Vol. LIII, No. 9, pp. 27-30.

Skeffington, A. M. The Practical Value of an Office Assistant. Opt. Age. Vol. 20, No. 11, pp. 51-52.

Sweeting, R. E. The Single Cylinder Test. Opt. Age. Vol. 20, No. 11, pp. 39-41.

Whitten, J. E. Subjective Work. Opt. Age. Vol. 20, No. 11, pp. 43-44.

OCULAR MUSCLES

Lyon, W. B. Anatomical Exophoria. N. W. Jour. of Optom. Vol. 1, No. 3, pp. 49-50.

Steinfeld, M. Convergence Weakness. N. W. Jour. of Optom. Vol. 1, No. 3 (Ill.), pp. 42-44.

OPHTHALMOSCOPY

Maybee, W. G. Ophthalmoscopy. The Conn. Optom. Vol. 1, No. 1, pp. 9-10.

INDUSTRIAL EYE WORK

Cox, C. E. A New Method of Making School Surveys (Abst.). N. W. Jour. of Optom. Vol. 1, No. 3, pp. 51-52.

Goldfuss, M. A., and Herman, I. L. Optometric Services in Schools (Ill.). Opt. Jour. and Rev. Vol. LIII, No. 8, pp. 33-34.

Optometric Clinics (Special Report) (Ill.). Opt. Age. Vol. 20, No. 11, pp. 59-60.

OCULAR PATHOLOGY

Clapp, C. A. The Liquefaction and Absorption of the Crystiline Lens. E. E. N. & T. Mo. (Abst.). Vol. 3, No. 2, p. 106.

Greenwood, A. Retinal Trombosis (Abst.). E. E. N. & T. Mo. Vol. 3, No. 2, pp. 110-111.

Harbridge, D. F. Optic Atrophy Manifested by Visual Disturbance Following Distance Hemorrhage (Ill.). Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 192-195.

Hutshing, E. E. Ocular Infections (Abst.). N. W. Jour. of Optom. Vol. 1, No. 3, p. 51.

Kress, G. H. Cysticercus of the Vitreous with Case Report (Pl.) (Ill.). Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 182-191.

Merrill, U. H., and Wagner, H. P. Anomalous Spiral Looping of a Retinal Vein (Pl.). Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 177-179.

Parsons, J. G. Iritis Tubeiculosa. E. E. N. & T. Mo. Vol. 3, No. 2, pp. 80-82.

Payne, S. M. Sequelae of Trachoma. E. E. N. & T. Mo. Vol. 3, No. 2, pp. 86-88.

Pottle, F. W. Diagnosis of Eyestrain Caused by Dental Irritations (Ill.). Opt. Age. Vol. 20, No. 11, pp. 23-26.

Przibram, H. Giving Sight to Animals Deprived of Functioning Eyes. Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 179-181.

Smith, P. Blood Pressure in the Eye and Its Relation to Chamber Pressure (Abst.). Amer. Jour. of Oph. Series 3, Vol. 7, No. 3, pp. 246-247.